CITY OF RICHFIELD (PWS 5320005)
SOURCE WATER ASSESSMENT FINAL REPORT

September 27, 2002

State of Idaho
Department of Environmental Quality

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Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment area, sensitivity factors associated with the wells, and aquifer characteristics.

This report, *Source Water Assessment for the City of Richfield, Richfield, Idaho,* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

Final susceptibility scores are derived from equally weighting system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Therefore, a low rating in one or two categories coupled with a higher rating in other categories results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a well can get is moderate. Potential contaminants are divided into four categories, inorganic contaminants (IOCs, e.g. nitrates, arsenic), volatile organic contaminants (VOCs, e.g. petroleum products), synthetic organic contaminants (SOCs, e.g. pesticides), and microbial contaminants (e.g. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

The City of Richfield (PWS #5320005) drinking water system consists of three ground water wells. Well #1 (West Latah Well) is located in the center of the city and Well #2 Backup (South Main Street Well) and Well #3 (West Lincoln Street Well) are located to the south of Highway 26/93 (Figure 1). The system serves 420 persons through approximately 205 connections.

Well #1 and Well #3 have an overall moderate susceptibility to IOCs, VOCs, SOCs, and an automatic high susceptibility to microbial contaminants. Well #2 has an overall moderate susceptibility to IOCs, VOCs, SOCs, and microbial contaminants (Table 1). Surface soil properties led to the moderate hydrologic sensitivity rating for all three wells. A recent sanitary survey (DEQ, 2000) and the Well #3 log contributed to the moderate system construction rating for all three wells. The potential contaminant/land use rating differed for the well north of the highway (Well #1) having moderate to low ratings and the wells south of the highway (Well #2 and #3) having high to moderate ratings (Table 1).

The most significant water quality issue for the City of Richfield is that of total coliform bacteria. Repeat detections of total coliform bacteria have been detected in Well #1 and Well #3 in July 1998 and January 1997. Both total coliform bacteria and fecal coliform bacteria were detected in Well #3 in October 1993. The IOCs arsenic, nitrate, cadmium, chromium, antimony, cyanide, mercury, and fluoride have been detected in the water system but at levels below the maximum contaminant levels (MCLs) set by the EPA. No SOCs or VOCs have been detected in the City of Richfield water system thus far.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the City of Richfield, drinking water protection activities should first focus on maintaining the requirements of the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). Any spills that occur within the delineated area should be carefully monitored, as should any future development. Other practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water areas should be implemented. Also, disinfection practices should be maintained if microbial contamination becomes a problem. No chemicals should be stored or applied within the 50-foot radius of the wellhead. Most of the designated areas are outside the direct jurisdiction of the City of Richfield, making partnerships with state and local agencies and industry groups critical to success of drinking water protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineations are near urban and residential land use areas. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. There are major transportation corridors through the delineations (Highway 26/93 and the Union Pacific Railroad), therefore the State Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil Conservation District, and the Natural Resources Conservation Service.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Twin Falls Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR THE CITY OF RICHFIELD, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the rankings of this assessment mean.** Maps showing the delineated source water assessment areas and the inventory of significant potential sources of contamination identified within those areas are attached. The lists of significant potential contaminant source categories and their rankings, used to develop this assessment, are also attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess the over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells, and aquifer characteristics. All assessments must be completed by May of 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of this assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treating a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The City of Richfield drinking water system includes three community ground water wells that serve a population of 420 through approximately 205 connections. The wells are located within the City of Richfield (Figure 1).

The most significant water quality issue for the City of Richfield is that of total coliform bacteria. Repeat detections of total coliform bacteria have been detected in Well #1 and Well #3 in July 1998 and January 1997. Both total coliform bacteria and fecal coliform bacteria were detected in Well #3 in October 1993. The IOCs arsenic, nitrate, cadmium, chromium, antimony, cyanide, mercury, and fluoride have been detected in the water system but at levels below the maximum contaminant levels (MCLs) set by the EPA. No SOCs or VOCs have been detected in the City of Richfield water system thus far.

Defining the Zones of Contribution – Delineation

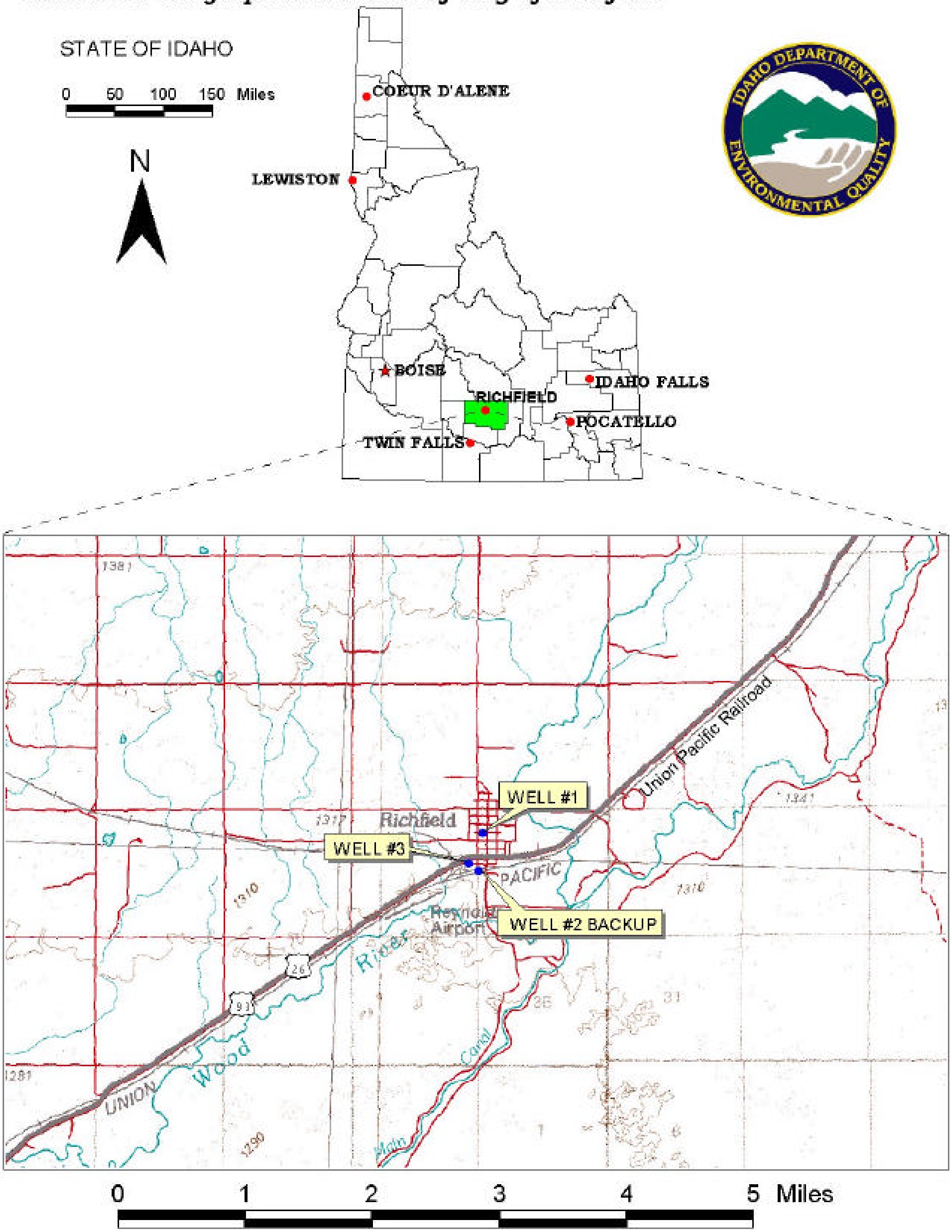
The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ used a refined computer model approved by the EPA in determining the time-of-travel (TOT) zones for water associated with the Snake River Plain (SRP) aquifer. The computer model used site-specific data, assimilated by DEQ and Washington Group International (WGI) from a variety of sources including local area well logs, the City of Richfield Well #3 log, and hydrogeologic reports summarized below (as reproduced from WGI, 2001).

The Eastern SRP is a northeast trending basin located in southeastern Idaho. The 10,000 square miles of the plain are filled primarily with highly fractured layered Quaternary basalt flows of the Snake River Group, which are intercalated with sedimentary rocks along the margins (Garabedian, 1992, p. 5). Individual basalt flows range from 10 to 50 feet thick, averaging 20 to 25 feet thick (Lindholm, 1996, p. 14). Basalt is thickest in the central part of the eastern plain and thins toward the margins. Whitehead (1992, p. 9) estimates the total thickness of the flows to be as great as 5,000 feet. A thin layer (0 to 100 feet) of windblown and fluvial sediments overlies the basalt.

The layered basalts of the Snake River Group host one of the most productive aquifers in the United States. The aquifer is generally considered unconfined, yet may be confined locally because of interbedded clay and dense unfractured basalt (Whitehead, 1992, p. 26). Whitehead (1992, p. 22) reports that well yields of 2,000 to 3,000 gallons per minute (gpm) are common for wells open to less than 100 feet of the aquifer. Lindholm (1996, p. 18) estimates aquifer thickness to range from 100 feet near the plain's margin to thousands of feet near the center. Models of the regional aquifer have used values ranging from 200 to 3,000 feet to represent aquifer thickness (Cosgrove et al., 1999, p. 15).

Regional ground water flow is to the southwest paralleling the basin (Cosgrove et al., 1999; deSonneville, 1972, p. 78; Garabedian, 1992, p. 48; and Lindholm, 1996, p. 23). Reported water table gradients range from 3 to 100 feet/mile and average 12 feet/mile (Lindholm, 1996, p. 22). Gradients steepen at the plain's margin and at discharge locations.

FIGURE 1. Geographic Location of City of Richfield



The majority of aquifer recharge results from surface water irrigation activities (incidental recharge), which divert water from the Snake River and its tributaries (Ackerman, 1995, p. 4, and Garabedian, 1992, p. 11). Natural recharge occurs through stream losses, direct precipitation, and tributary basin underflow.

The Shoshone area is located in the western corner of the Snake Plain. Whitehead (1992, Plate 3) indicates basalt and aquifer thicknesses similar to those in the American Falls area. Ground water flow is to the west and southwest where it discharges into the Snake River through a series of springs (Garabedian, 1986, Plate 4; Lindholm, 1996, p.23). Areal recharge from precipitation and irrigation throughout the area is variable, ranging between 2 and 20 inches/year (Garabedian, 1992, Plate 8).

In conducting the WhAEM2000 modeling (Kraemer et al., 2000), DEQ used constant head boundaries from the spring of 1980 (Garabedian, 1986) as well as Statewide Monitoring Network Wells sampled in 1994 for calibration purposes. The delineated source water assessment area for Well #1 can be described as an ellipse about 1 mile long and ¾ of a mile wide extending to the northeast with Highway 26/93 along the southern border. The Well #2 delineation is a distorted wedge shape extending to the east about 1 mile and southeast about ½ mile. Well #3 has the largest delineation with nearly circular dimensions of 1 ½ miles in diameter (Figures 2, 3, 4; Appendix A). The actual data used by DEQ in determining the source water assessment delineation area is available upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and the City of Richfield and from available databases.

The dominant land use outside the area of the City of Richfield is predominantly irrigated agriculture and rangeland. Land use within the immediate area of the wellheads consists of urban and residential uses.

It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used at the facility. Many potential sources of contamination are regulated at the federal level, state level, or both, to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the <u>potential</u> for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, such as educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A contaminant inventory of the study area was conducted in October 2001 and May 2002. This involved identifying and documenting potential contaminant sources within the City of Richfield source water assessment areas through the use of computer databases and Geographic Information System maps developed by DEQ. The second, or enhanced, phase involved contacting the operator to add any new potential sources in the area.

The delineation of Well #1 (Figure 2, Table A1, Appendix A) has two dairies as potential contaminant sources. The Well #2 delineation (Figure 3, Table A2, Appendix A) has a site regulated by the Superfund Amendments and Reauthorization Act (SARA) and a sand and gravel pit. The Well #3 delineation (Figure 4, Table A3, Appendix A) has 11 potential contaminant sites, including multiple underground storage tanks (USTs), a cheese processing facility, industrial and municipal wastewater land application sites, dairies, and a sand and gravel pit. In addition, the Well #2 and Well #3 delineations cross the Union Pacific Railroad and Highway 26/93. An accidental spill from one of these major thoroughfares could add any potential contaminant to the aquifer.

Section 3. Susceptibility Analyses

Each well’s susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Appendix B contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

The hydrologic sensitivity was moderate for each of the wells. Regional soil classification has the delineations underlying poor to moderately drained soils, which decrease the downward movement of contaminants. In addition, the water table is located greater than 300 feet below ground surface (bgs). No sedimentary interbeds are indicated on the Well #3 log.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

A sanitary survey was recently conducted (DEQ, 2000). It concluded that Wells #1 and #3 had properly constructed wellheads with downturned, screened vents, and were properly protected from surface flooding. The needed improvements for Well #2, as detailed in the sanitary survey, have been completed. This information caused the system construction rating for all the wells to be rated as moderate.

Wells #1 and #2 did not have well logs because they were installed in the early 1900s, but the sanitary survey provided some well construction information. Well #1 has a 10-inch casing and was drilled to a depth of 490 feet bgs, with a water table at 345 feet bgs. Well #2 has an eight-inch casing and was drilled to a depth of 410 feet bgs with a static water table of 311 feet bgs.

The Well #3 log provided the following information. Well #3 was drilled in November 1989 using a 16- and 12-inch diameter borehole. 12-inch diameter, 0.250-inch thick casing was installed to 180 feet bgs into black basalt. The annular seal was placed to 180 feet bgs using cement grout. Below 180 feet bgs, there is an open borehole. The water table is located at 322 feet bgs. The sanitary survey indicates that the well is properly vented, down turned, and screened and that the well is protected from surface flooding.

Though the wells of the City of Richfield may have met standards at the time of construction, current well construction standards are stricter. The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all Public Water Systems (PWSs) to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. Some of the requirements include casing thickness, well tests, and depth and formation type that the surface seal must be installed into. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells. Twelve-inch diameter wells require a casing thickness of at least 0.375 inches, ten-inch diameter wells require a casing thickness of at least 0.365 inches, and eight-inch diameter wells require a casing thickness of at least 0.322 inches. Well tests are required at the design pumping rate for 24 hours or until stabilized drawdown has continued for at least six hours when pumping at 1.5 times the design pumping rate.

Potential Contaminant Source and Land Use

For the City of Richfield, Well #1 has a moderate land use rating to IOCs (e.g. arsenic, nitrate) and a low land use rating for VOCs (e.g. petroleum products), SOCs (e.g. pesticides), and microbials (e.g. bacteria) (Table 4). These relatively low scores are due to the lack of potential contaminant sources and the fact that the delineation does not contain the highway or the railroad.

Well #2 and Well #3 rate high land use for IOCs, VOCs, and SOCs, and have a moderate land use rating for microbial contamination (Table 1). Both have more potential contaminant sources and each contains both Highway 26/93 and the railroad.

Final Susceptibility Rating

An IOC detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well, despite the land use of the area, because a pathway for contamination already exists. Additionally, the storage or application of any potential contaminants within 50 feet of the wellhead will automatically lead to a high score. In this case, both Well #1 and Well #3 automatically rate high to microbial contamination because of the repeat total coliform detections in January 1997 and July 1998. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year time-of-travel zone (Zone 1B) and much agricultural land contribute greatly to the overall ranking. In terms of total susceptibility, Well #1 and Well #3 rate moderate for all contaminant types, except as noted above. Well #2 rates moderate for IOCs, VOCs, SOCs, and microbial contaminants (Table 1).

Table 1. Summary of the City of Richfield Susceptibility Evaluation

Source	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Contaminant Inventory/Land Use				System Construction	**Final Susceptibility Ranking**			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	M	M	L	L	L	M	M	M	M	H*
Well #2	M	H	H	H	M	M	M	M	M	M
Well #3	M	H	H	H	M	M	M	M	M	H*

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
H* = well rated automatically high due to repeat bacterial detections in the well

Susceptibility Summary

In terms of total susceptibility, Wells #1 and #3 rate moderate susceptibility to IOCs, VOCs, and SOCs, and automatically high for microbial contamination. Well #2 rates moderate for all contaminant types. Surface soil properties led to the moderate hydrologic sensitivity rating for all three wells. A recent sanitary survey (DEQ, 2000) and the Well #3 log contributed to the moderate system construction rating for all three wells. The potential contaminant/land use rating differed for the well north of the highway (Well #1) having moderate to low ratings and the wells south of the highway with delineations containing Highway 26/93 (Well #2 and #3) having high to moderate ratings.

The most significant water quality issue for the City of Richfield is that of total coliform bacteria. Repeat detections of total coliform bacteria have been detected in Well #1 and Well #3 in July 1998 and January 1997. Both total coliform bacteria and fecal coliform bacteria were detected in Well #3 in October 1993. The IOCs arsenic, nitrate, cadmium, chromium, antimony, cyanide, mercury, and fluoride have been detected in the water system but at levels below the MCLs set by the EPA. No SOCs or VOCs have been detected in the City of Richfield water system thus far.

Section 4. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For the City of Richfield, drinking water protection activities should first focus on maintaining the requirements of the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system’s components and its capacity). Any spills that occur within the delineated area should be carefully monitored, as should any future development. Other practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water areas should be implemented. Also, disinfection practices should be maintained if microbial contamination becomes a problem. No chemicals should be stored or applied within the 50-foot radius of the wellhead. Most of the designated areas are outside the direct jurisdiction of the City of Richfield, making partnerships with state and local agencies and industry groups critical to success of drinking water protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineations are near urban and residential land use areas. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. There are major transportation corridors through the delineations (Highway 26/93 and the Union Pacific Railroad), therefore the State Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil Conservation District, and the Natural Resources Conservation Service.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Twin Falls Regional Office of the DEQ or the Idaho Rural Water Association.

Assistance

Public water suppliers and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Twin Falls Regional DEQ Office	(208) 736-2190
State DEQ Office	(208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Ms. Melinda Harper, Idaho Rural Water Association, at 208-343-7001 (mharper@idahoruralwater.com) for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund≅ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

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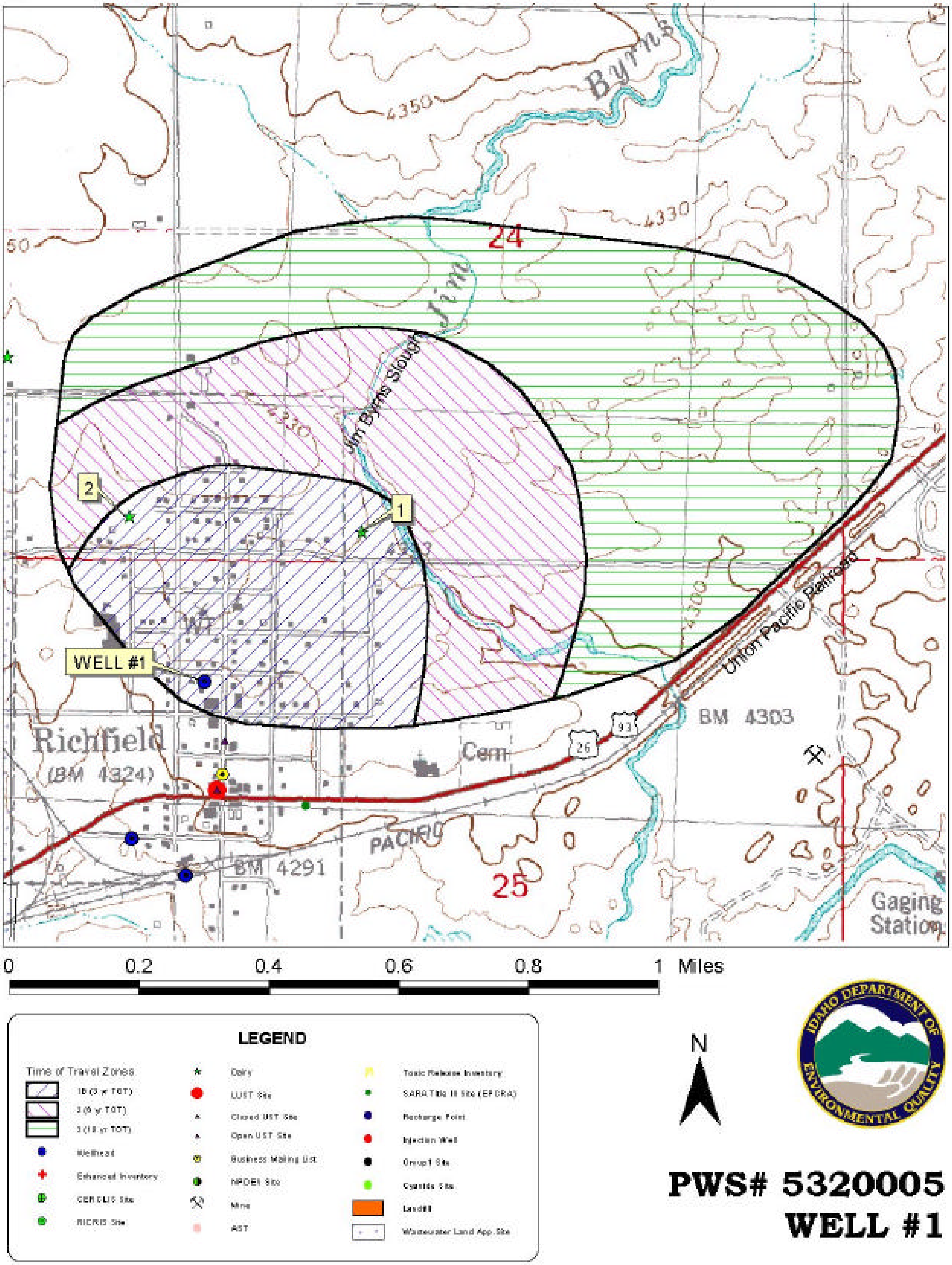
Appendix A

City of Richfield
Delineation Figures &
Potential Contaminant Inventory Tables

Figure 2. City of Richfield Delineation Map and Potential Contaminant Source Locations



PWS# 5320005

WELL #1

Figure 3. City of Richfield Delineation Map and Potential Contaminant Source Locations

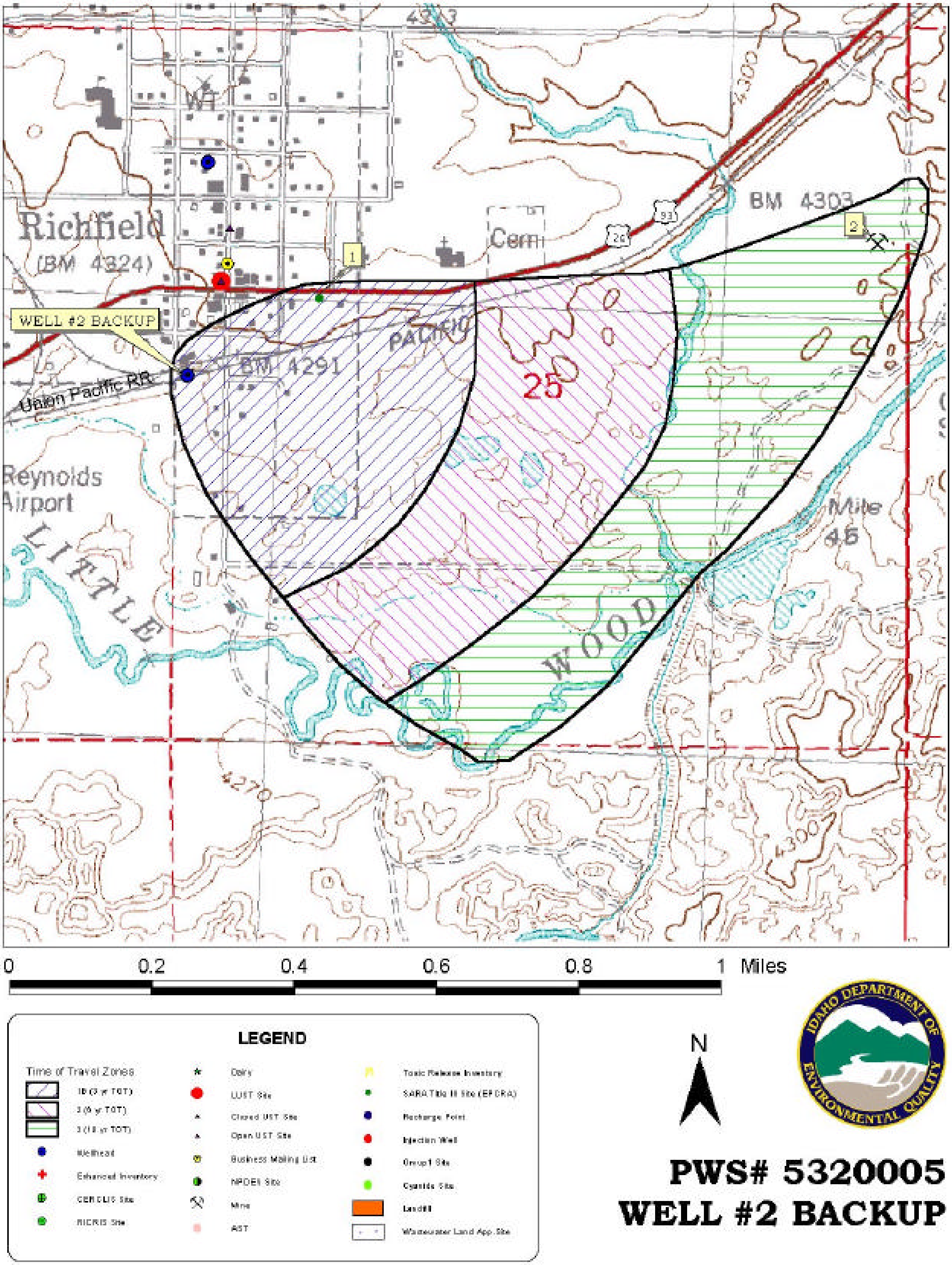


Figure 4. City of Richfield Delineation Map and Potential Contaminant Source Locations

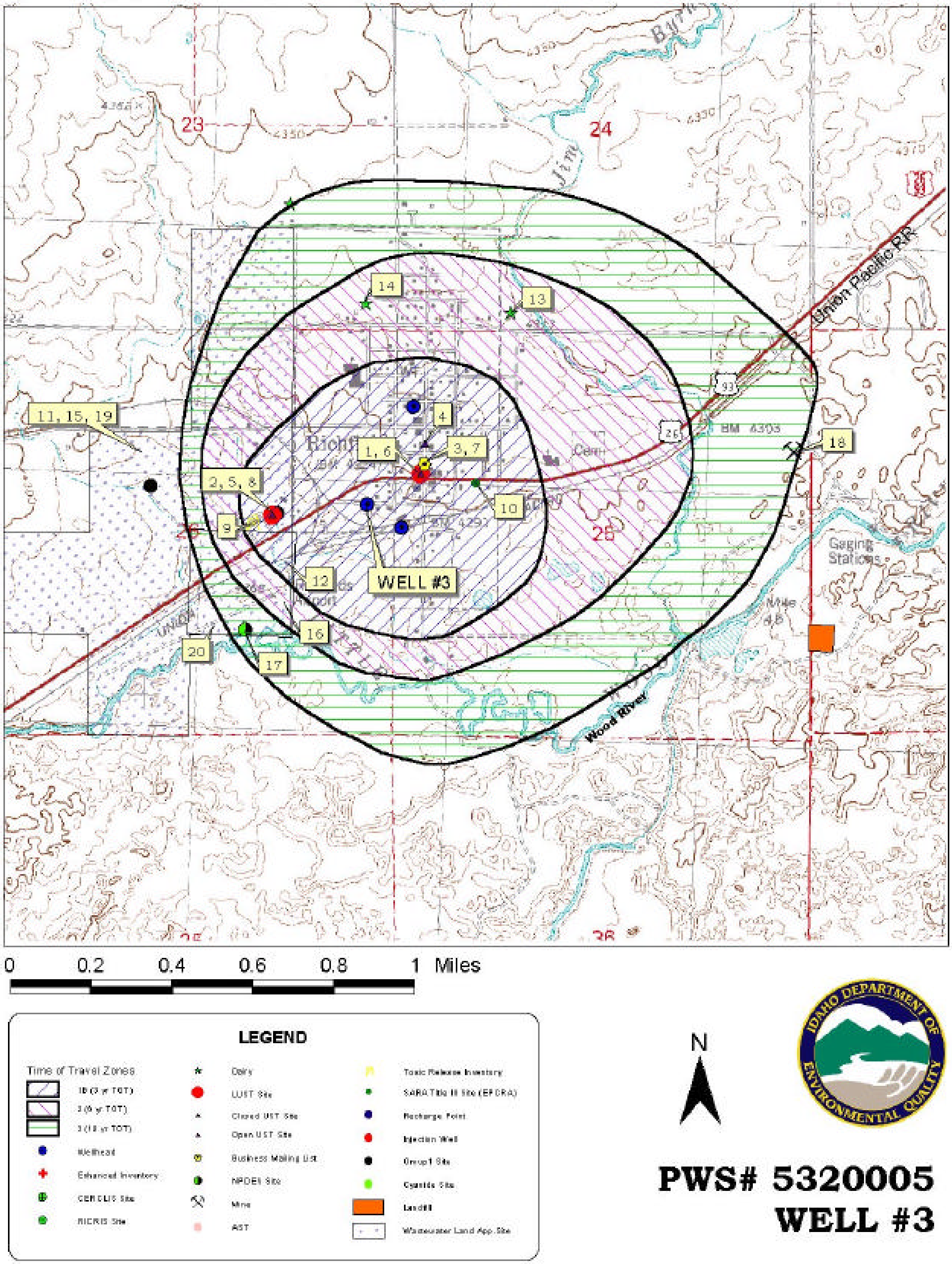


Table A1. City of Richfield Well #1, Potential Contaminant Inventory

Site #	Source Description[1]	TOT ZONE[2]	Source of Information	Potential Contaminants[3]
1	Dairy <=200 cows	0 – 3	Database Search	IOC, Microbes
2	Dairy <=200 cows	0 – 3	Database Search	IOC, Microbes

[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table A2. City of Richfield Well #2, Potential Contaminant Inventory

Site #	Source Description[1]	TOT ZONE[2]	Source of Information	Potential Contaminants[3]
1	SARA site	0 – 3	Database Search	IOC, Microbes
	Highway 26/93	0 – 6	GIS Map	IOC, VOC, SOC, Microbes
	Union Pacific Railroad	0 – 6	GIS Map	IOC, VOC, SOC, Microbes
2	Sand and gravel pit	6 – 10	Database Search	IOC, VOC, SOC

[1] SARA = Superfund Amendments and Reauthorization Act
[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table A3. City of Richfield Well #3, Potential Contaminant Inventory

Site #	Source Description[1]	TOT ZONE[2]	Source of Information	Potential Contaminants[3]
1, 6	LUST site cleanup completed, Impact: Unknown; UST – closed	0 – 3	Database Search	VOC, SOC
2, 5, 8, 9	LUST site cleanup completed, Impact: Unknown; UST – closed; NPDES site – industrial; TRI site	0 – 3	Database Search	IOC, VOC, SOC
3, 7	UST – open; Automobile Repairing & Service	0 – 3	Database Search	IOC, VOC, SOC
4	UST – closed	0 – 3	Database Search	VOC, SOC
10	SARA site	0 – 3	Database Search	IOC, Microbes
11, 15, 19	WLAP – cheese processing	0 – 10	Database Search	IOC, VOC, Microbes
12, 16, 20	WLAP – municipal	0 – 10	Database Search	IOC, VOC, SOC, Microbes
	Highway 26/93	0 – 10	GIS Map	IOC, VOC, SOC, Microbes
	Union Pacific Railroad	0 – 10	GIS Map	IOC, VOC, SOC, Microbes
13	Dairy <=200 cows	3 – 6	Database Search	IOC
14	Dairy <=200 cows	3 – 6	Database Search	IOC
17	NPDES – municipal	6 – 10	Database Search	IOC
18	Sand and gravel pit	6 – 10	Database Search	IOC, VOC, SOC

[1] LUST = leaking underground storage tank; UST = underground storage tank; NPDES = National Pollutant Discharge Elimination System; TRI = Toxic Release Inventory; SARA = Superfund Amendments and Reauthorization Act; WLAP = wastewater land application site
[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Appendix B

City of Richfield Susceptibility Analysis Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report

Public Water System Name : RICHFIELD CITY OF

Well# : WELL #1

Public Water System Number 5320005

07/11/2002 3:04:37 PM

1. System Construction

		SCORE
Drill Date	01/01/1900	
Driller Log Available	NO	
Sanitary Survey (if yes, indicate date of last survey)	YES	2000
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		4

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	YES	0
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	YES	0
Aquitard present with > 50 feet cumulative thickness	NO	2
Total Hydrologic Score		3

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	NO	NO	NO	YES
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	2	0	0	2
(Score = # Sources X 2) 8 Points Maximum		4	0	0	4
Sources of Class II or III leacheable contaminants or	YES	2	0	0	
4 Points Maximum		2	0	0	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		6	0	0	4
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		3	2	2	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		2	1	1	0
Cumulative Potential Contaminant / Land Use Score		13	5	5	6

4. Final Susceptibility Source Score

	IOC	VOC	SOC	Microbial
4. Final Susceptibility Source Score	10	8	8	9
5. Final Well Ranking	Moderate	Moderate	Moderate	High

Ground Water Susceptibility Report   Public Water System Name : RICHFIELD CITY OF   Well# : WELL #2 BACKUP

Public Water System Number 5320005   07/11/2002 3:04:47 PM

1. System Construction		SCORE			
Drill Date	01/01/1905				
Driller Log Available	NO				
Sanitary Survey (if yes, indicate date of last survey)	YES	2000			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	NO	1			
Well located outside the 100 year flood plain	YES	0			
Total System Construction Score		4			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	YES	0			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	YES	0			
Aquitard present with > 50 feet cumulative thickness	NO	2			
Total Hydrologic Score		3			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	4	3	3	3
(Score = # Sources X 2) 8 Points Maximum		8	6	6	6
Sources of Class II or III leacheable contaminants or	YES	7	2	2	
4 Points Maximum		4	2	2	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		16	12	12	10
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		5	5	5	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0
Cumulative Potential Contaminant / Land Use Score		26	22	22	12
4. Final Susceptibility Source Score		12	11	11	11
5. Final Well Ranking		Moderate	Moderate	Moderate	Moderate

Ground Water Susceptibility Report   Public Water System Name : RICHFIELD CITY OF   Well# : WELL #3

Public Water System Number 5320005   07/11/2002 3:04:58 PM

1. System Construction		SCORE			
Drill Date	11/10/1989				
Driller Log Available	YES				
Sanitary Survey (if yes, indicate date of last survey)	YES	2000			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	NO	1			
Casing and annular seal extend to low permeability unit	YES	0			
Highest production 100 feet below static water level	NO	1			
Well located outside the 100 year flood plain	YES	0			
	Total System Construction Score	3			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	YES	0			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	YES	0			
Aquitard present with > 50 feet cumulative thickness	NO	2			
	Total Hydrologic Score	3			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	NO	NO	NO	YES
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	7	8	7	5
(Score = # Sources X 2) 8 Points Maximum		8	8	8	8
Sources of Class II or III leacheable contaminants or	YES	9	5	3	
4 Points Maximum		4	4	3	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		16	16	15	12
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		5	5	5	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0
Cumulative Potential Contaminant / Land Use Score		26	26	25	14
4. Final Susceptibility Source Score		11	11	11	11
5. Final Well Ranking		Moderate	Moderate	Moderate	High